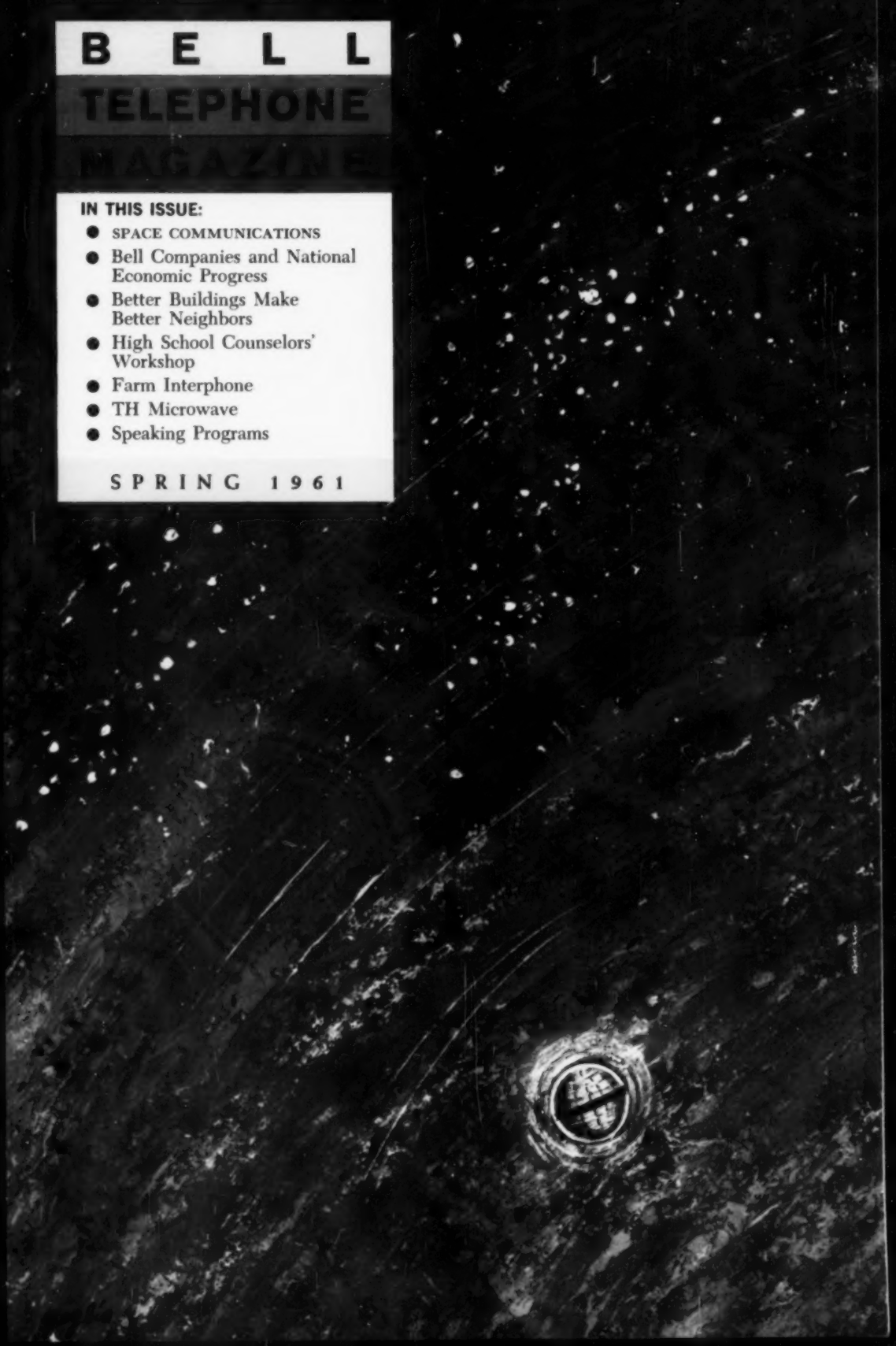
BELL TELEPHONE MAGAZINE

IN THIS ISSUE:

- SPACE COMMUNICATIONS
- Bell Companies and National Economic Progress
- Better Buildings Make Better Neighbors
- High School Counselors' Workshop
- Farm Interphone
- TH Microwave
- Speaking Programs

SPRING 1961



VOLUME XL NUMBER ONE SPRING 1961

BELL TELEPHONE MAGAZINE

A non-technical review, published quarterly to give Bell System management people a broader view of the history, objectives, operations, and achievements of this business than they might attain in the course of their day-to-day occupations, and an added sense of participation in the problems and accomplishments of our nation-wide public service.

COVER: An imaginative glimpse into the future is given us by Salvatore Giglio, A. T & T. staff artist, with his view of an experimental active satellite as it might look in orbit. This dramatic painting was inspired by the lead article in this issue on our space communication proposal.

Bell's Plan in Space 2
James M. Freeman

Bell Telephone Companies and National Economic Progress 8
Edgar Peske

Better Buildings Make Better Neighbors 12
Howard E. Phillips

Labels or Loopholes? An Editorial 20

Speech . . . 22

A New Voice For The Farm 32
Jack W. Basford

A Workshop For High School Counselors 37
Eugene E. Mark

TH Opens New Vista in Microwave 44
Richard D. Campbell

Who's Who & What's What In This Issue 49

In The News 54

A MEDIUM OF SUGGESTION and A RECORD OF PROGRESS

GEORGE B. TURRELL, JR., *Editor* SALVATORE J. TAIBBI, *Art Editor*

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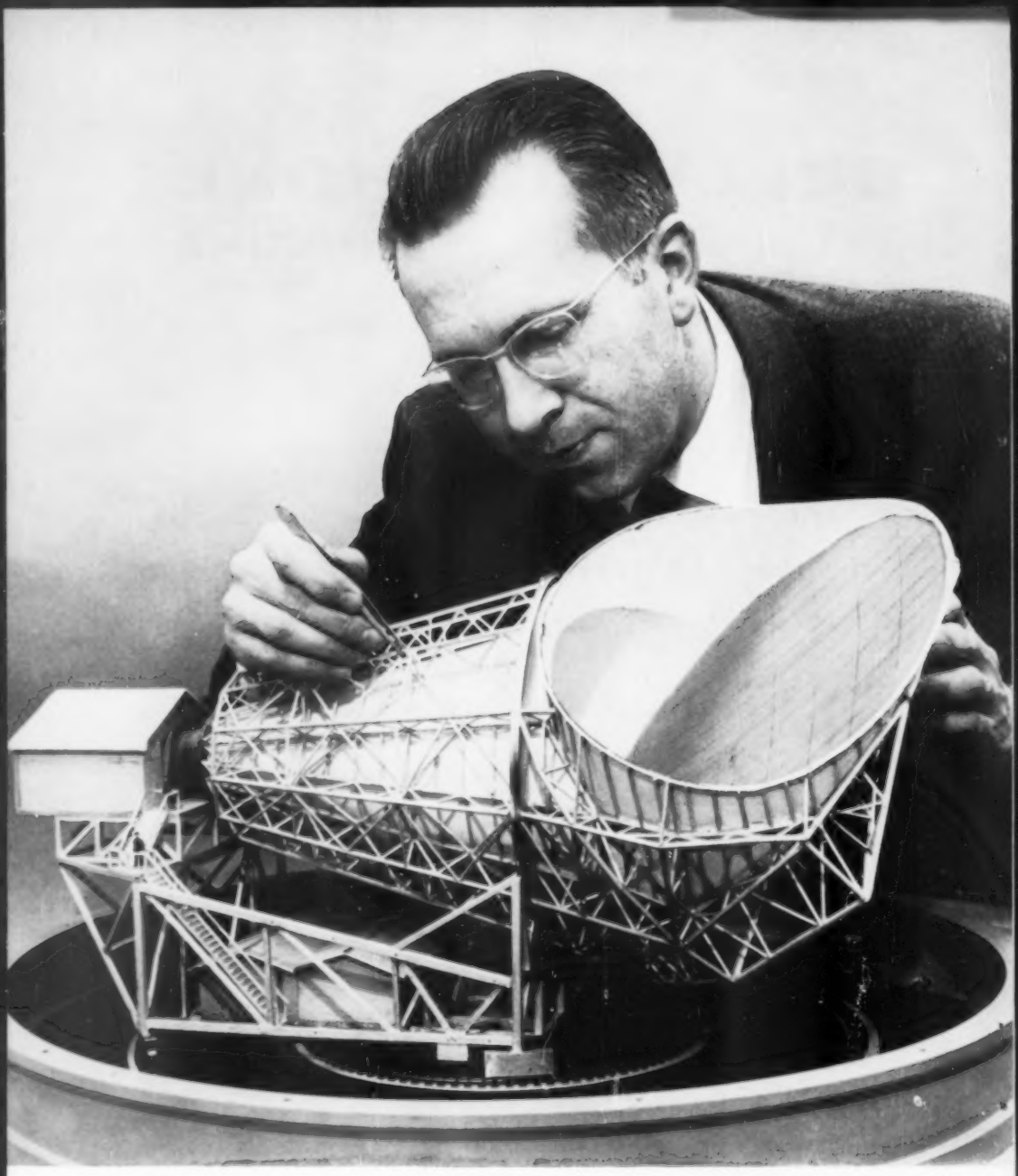
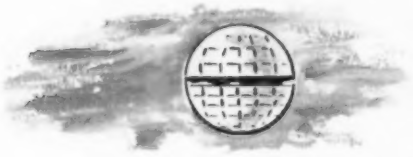


Bell Laboratories *has designed "world's biggest horn" for satellite communication ground station. A. O. Schwarz checks model.*

First, you must have a good plan; the Bell System has just that for space communication. Second, you must make it plain what your plan is; here's where you and I come in

Bell's Plan in Space

James M. Freeman, *Assistant Vice President*
PUBLIC RELATIONS DEPARTMENT, A. T. & T. CO.



It was a quiet period in most newspaper offices throughout the country. The "mornings" were pretty well set, while the "afternoons" still had a few hours to go before the first-edition deadline.

Then a wire service printer jangled like a cranky alarm clock, signalling an upcoming bulletin. Its keys beat a staccato across a roll of rough copy paper until there appeared a paragraph that ultimately read like this in many papers from coast to coast:

> "WASHINGTON, Aug. 12 (AP) — The United States, on one of its proudest days in the space age, today sent into orbit high above the earth a giant balloon that could lead to new marvels of space communications."

Thus was Project Echo announced to America and the world.

The story captured the imagination of the American people to a greater extent perhaps than any other space story up to that time. Echo was not just another piece of hardware fired from some remote spot on the sands of Florida. It was one that could be "seen" by anyone taking the trouble to step outside, look skyward and watch Echo I in orbit. As a result, the balloon was for a while this country's greatest outdoor attraction.

Most papers published what the *Detroit Free Press* termed, "Ye Compleat Guide to Fine Art of Echo Watching." Radio and television stations announced the most favorable times to view the new satellite. Americans, as well as their foreign brothers, for several evenings went to backyard, to porch, to hilltop, and peered skyward. One suburbanite grumbled, "Couldn't see it from my yard—too

many trees. Had to drive all the way out to the city park."

And who is to say that every time Americans caught a glimpse of Echo, their national pride wasn't lifted.

The pride of more than 700,000 Bell System men and women certainly should have been.

Bell System Set Stage for Echo

For the System, working with the National Aeronautics and Space Administration, played a key role in the project. And a long line of Bell technical achievements had helped set the stage for it.

Decades earlier, Karl Jansky and J. G. Chaffee of Bell Telephone Laboratories had established many of the principles on which space communication is based.

John R. Pierce of the Laboratories wrote a paper describing satellite communication in 1954, before anybody even had a rocket to lift a satellite from which to communicate. Rudolf Kompfner, C. Chapin Cutler and William Jakes of the Labs had lived with the Echo Project for years.

A Bell Guidance System commanded the Thor Delta rocket which put Echo into orbit.

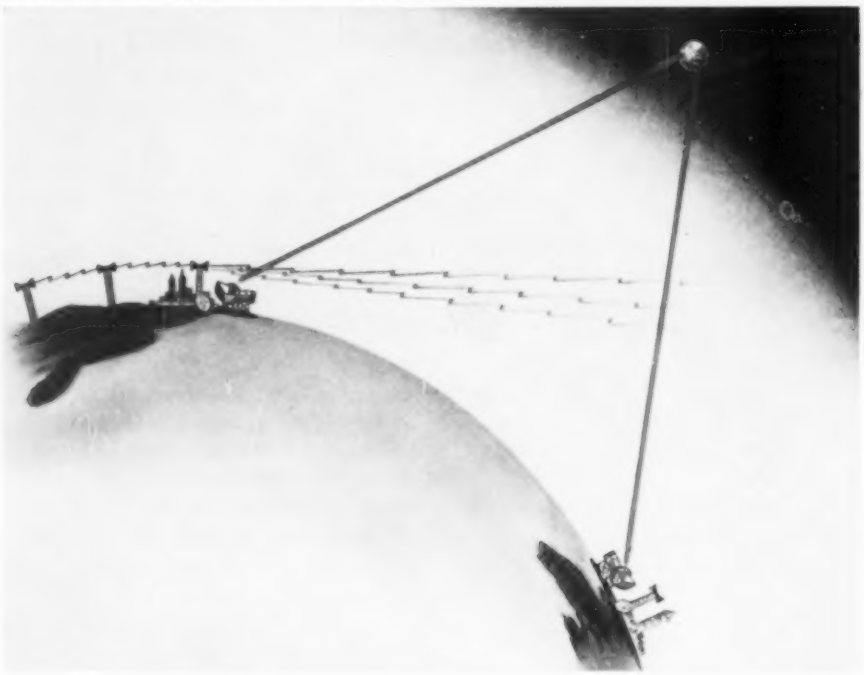
A telephone conversation which Bell Laboratories bounced off the moon a few weeks earlier had provided a graphic demonstration of the potential of satellite communication.

The list of credits goes on and on.

Our contributions to many of these ventures, particularly Echo, were well heralded—and justly so—in newspapers, on television and over radio.

We set up news coverage of our "Moonbounce" demonstration and, in cooperation with NASA, issued press releases, films and advertisements telling of our participation in the Echo

Microwaves, *beamed across the ocean, would soar off into space without something to intercept and relay them. This is the job of the satellite, to keep waves on the track.*



experiment. The material received wide usage and the Bell System got wide acclaim.

But one success does not mean completion of a mission any more than writing one good chapter means completion of a book.

Today the impact of Echo, true to its name, is fading.

But, Bell System space efforts have not been fading. Rather, they've been stepped up.

Major Step Due

Right now, we stand at the threshold of a major step in space communications. We are well along on developing an experimental active satellite, one with built-in repeaters, which we expect to be the forerunner of an actual commercial satellite communication system.

The Federal Communications Commission has granted us frequencies in which to conduct the experiment. We need to get a rocket (or a half dozen) ready and we need to get it launched. The launching, at least from a timing standpoint, seems a major problem just now, as launching facilities are few. Cost isn't the problem—the Bell System is willing to pay for it.

Following experiments, we hope the government will authorize our operation of a commercial overseas satellite communication system, which would supplement the overseas cable and radio circuits employed in international communications today, as well as provide additional services not available now, such as television and high speed data transmission.

We've told our story concerning these plans and told it well over the past few months.

In June of 1960, President Kappel outlined our plans for Project Echo and other space achievements in a talk at the University of California at Los Angeles. In this address he set the tone for the entire Bell System space program when he said: "It was the Bell System, I may remind you, that pioneered world-wide telephony, first by radio and later through cables. We want and intend to be pioneers tomorrow, too. We are ready, willing and able to push ahead. All we need is the leeway, the freedom, to do our best."

The following month Bell System plans for a space communication network to carry telephone calls and TV programs throughout the world via a string of satellites circling the globe were given to the FCC in Washington and published throughout the country.

On October 23, 1960, in another well-publicized filing, the Bell System told of its plans to launch its first experimental satellite and asked the FCC for the experimental frequencies mentioned previously. They were assigned to us on January 19, 1961. On April 13, 1961, we told of our progress in constructing a $7 million experimental space communication ground station near Rumford, Maine.

Reporting Not Enough

As subsequent developments occur we plan to announce them as quickly and clearly as we can. But in doing so, we must also make sure there is an understanding of our goals and motives. We must not merely chronicle, we must interpret as well. Not only our progress, but also our policies must be made clear.

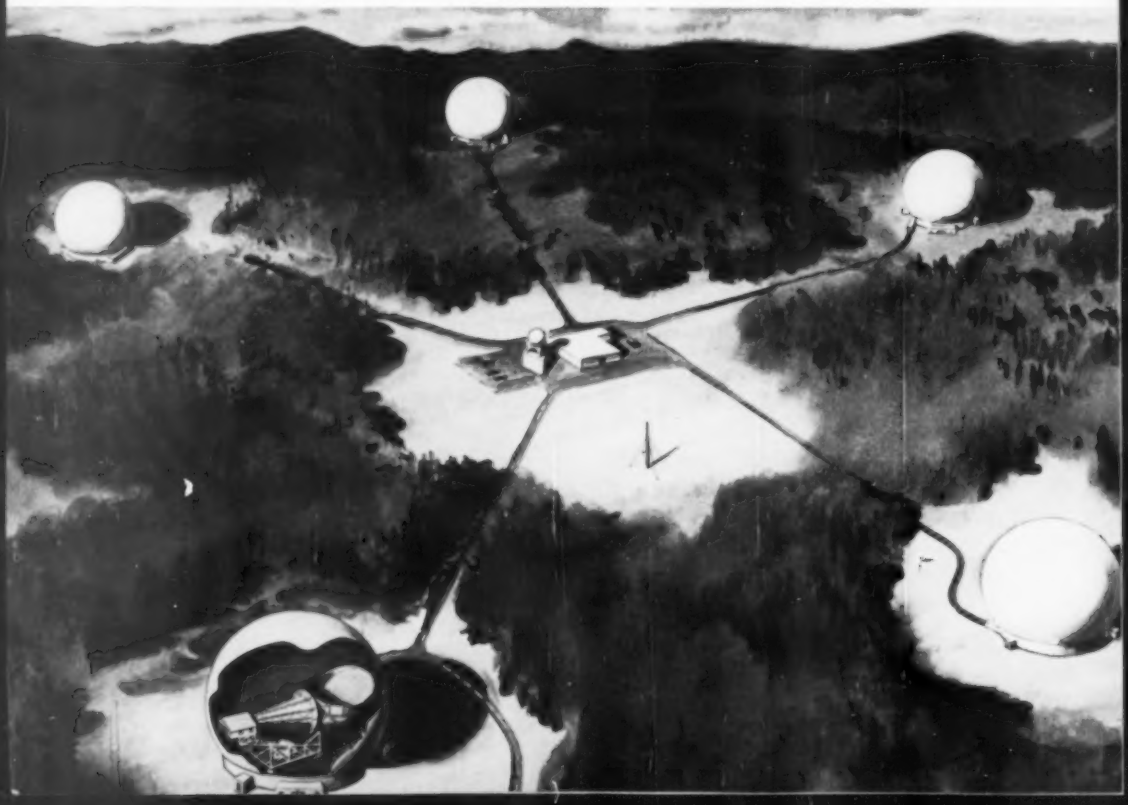
Briefly, these policies are as follows:

- A satellite communication system will be needed in the near future, not only to meet service

requirements but also to make sure the United States will lead in international space communication for peaceful purposes.

- We have not only an interest but a responsibility in the field of space communications. Our interest stems from the fact that a space communication system would be a natural extension of networks used in providing service to the public today. Our responsibility stems from the long-standing national policy that entrusts United States domestic and overseas communications to private enterprise, operating under government regulation. Obviously inherent in this responsibility is the duty to keep our facilities up to date and fully capable of meeting reasonable public demands.
- We do not seek a monopoly in space communication.
- The satellite communication system we propose would be available to all United States international communication common carriers—either through lease or ownership arrangements—for any services authorized by the FCC.
- Foreign ground terminals of our proposed system would be owned by foreign communications agencies, a traditional arrangement. Equitable arrangements would be worked out with them concerning ownership and use of satellites.
- We would expect to obtain much of the equipment for our system on a competitive basis from other companies. We would expect to obtain rockets and launching services from private suppliers, under

"Radome" *installation now being built near Rumford, Maine, ultimately may look like this. Each radome would house huge satellite communications antenna (see cutaway.)*



appropriate arrangements with the Government.

- We do not wish to exclude other international carriers either from establishing satellite communication systems or from sharing use of the system we propose.
- No subsidy by the United States Government would be involved in our communication system proposal. The Government would be reimbursed for any expenditures involved in the launchings.

Not All the Answers

Do these policies provide all the answers to space communication problems? Of course not.

Some of the answers aren't at hand. In fact, there will be new questions which today we can't even foresee.

But there are some things about which we *are* sure:

There is a need for expanded overseas facilities, and the need is now. The number of overseas calls is increasing about 20 per cent a year. Traffic estimates for the future sound fantastically high, but the nagging suspicion exists that they may actually prove too conservative.

Satellite communication systems promise to help meet this need by supplementing the overseas cable and radio circuits employed in international communications today.

Satellite communication can provide transoceanic television.

The Bell System is experienced and competent in space fields. To give one example, an active satellite couldn't be considered were it not for the power from the sun furnished by the Bell Solar Battery.

The U. S. policy of having communications handled by common carriers, under government supervision, has worked wonderfully well. Indeed, it has given America the world's best communications.

Finally, and perhaps this is most important of all, the Bell System is ready now, *willing to pay its own way, and able to do the job.*

What Can We Do?

This brings us to the question as to what you and I—telephone company people who know quite a lot about the business but aren't on speaking terms with a solar cell, a maser, or a traveling wave tube—can do about advancing the Bell System's program in space communication. The answer is that we can do quite a bit.

Back in 1910, Theodore N. Vail envisioned a universal interconnecting telephone system. But he attached an important condition to its attainment, a condition whose fulfillment is as necessary today as it was 50 years ago.

Such a system, said Mr. Vail, could " . . . only be brought about by putting before the public the fullest and most detailed information as to the company, its policy and purposes."

We will meet this condition only if each of us understands what the Bell System proposes to do—and why.

Much has been written and spoken about all phases of space—and space communication—during the past few months. The subject will consume many more pounds of printer's ink and hours of conversation before it has run its course.

Only by having a clear understanding of our "policy and purposes" in space, will we be able to answer the questions put to us by people both inside and outside the telephone business. Only with this approach will we meet our responsibilities in space communication.

Besides the communications services they render, the Bell Companies are making an important contribution to national growth

Bell Telephone Companies and National Economic Progress

Edgar Peske, *Assistant Vice President*
ADMINISTRATION G DEPARTMENT, A. T. & T. CO.

FROM THEIR EARLY history, the keystone objective of the Bell Telephone Companies has been the extension, enlargement and improvement of the communications services they furnish.

Today, as always, Bell people fully appreciate the importance of their jobs to the communications needs of their customers. They know that without the integrated national services they provide through the 21 Operating Companies, Western Electric and the Bell Laboratories—along with the services of other utilities—modern industry could hardly operate.

Not so well-known, however, is the large contribution made through the total of their individual efforts to a broad area much discussed currently: the Nation's economic growth and welfare.

Through their nearly three quarters of a million employees, the Bell System Companies have contributed far more than their proportionate share to the economic growth of the country. Since the war, the telephone service they furnish has increased 7½ per cent annually, more than double the yearly increase in Gross National Product, that is, the total goods and services produced by industry and government throughout the country. In terms of dollars, the Bell Companies' plant has grown 8 per cent yearly, much more rapidly than the average for all industry. This has been achieved through construction programs averaging $2.5 billion annually over the past five years and maintained at this level in 1961 in the face of a general business recession.

This means jobs—many of them and badly needed by the Nation especially now when unemployment is at a high level. Just one per cent of the construc-

tion program, for example, translates to more than four thousand jobs inside the Bell System and among its contractors and suppliers. Certainly this alone is a major contribution to the country's economic growth and stability. But there is much more.

Together in 1960 the Bell System Companies:

Provided not only nearly three quarters of a million jobs in their own organizations but many thousands more in other businesses which furnish them supplies and services.

Made purchases through the Western Electric Company, totaling $1¼ billion from 40,000 suppliers, mostly small businesses, located in 3500 towns and cities throughout the country.

Supported government to the amount of almost $1.9 billion in direct Federal, state and local taxes.

By technological and management advances over the years, made the production of telephone service so much more efficient that its cost to telephone customers is much lower—relative to increases in average income levels and other prices generally—than when inflation started in 1940.

Bell Laboratories' people and those who are engaged in research and development in other Bell Companies can take individual satisfaction from their special contributions to the national economy:

First, because their developments like new toll switching systems, the extension of customer dialing into new fields and their contributions to microwave have broadened the scope of telephone service, improved its quality and significantly countered sharp rises in wages and other costs.

Second, because just one of their postwar inventions—the transistor—has helped to found the entirely new semiconductor industry—an industry made up of many companies which, according to Leonard S. Silk, author of *The Research Revolution*, has advanced so rapidly as to rank, "probably, as the world's fastest-growing big business."

Finally, because their contributions to missile guidance and control systems, warning systems and controls and to satellite communication have enhanced national security and prestige. Thereby they have helped to make possible nationwide economic growth in the much stressed area of the nation's military strength.

Economic growth, most people would agree, is needed for both military and peacetime purposes. Russia—though still far behind us in most areas of production—is growing at a faster rate and putting a greater share of her production into military resources. Beyond this, we must also be concerned because over the next decade we will be adding an average of 3.5 million people annually to our population and 1.3 million to the labor force. Supporting the newcomers in itself will require an average increase of nearly 2 per cent in the Gross National Product annually. If, in addition, we are to better the average standard of living in line with our historical rate of increase, Gross National Product must be increased a total of about 3½ per cent yearly. Considering also our security requirements it becomes apparent that there is real need for stepping-up the pace of economic growth in this country beyond our long-term average of 3 per cent yearly.

Unfortunately, there has been much confused thinking and talking around

the country about economic growth. Calculating past rates of growth in itself has become something of a numbers game, with the results seemingly dependent on what those who pick the figures are trying to prove. Arbitrary objectives have been set, as though one has only to push a button to attain them. And the button to be pressed, according to those who take this tack, is most often the one marked "More Government Spending."

Government, of course, contributes much to economic growth and helps to make it possible. But much the greater share of our economic product comes from private industry, not government, and over the years we have succeeded in achieving the highest-level economy in the world mainly through private industry. To the extent that government spending is increased, this must be covered either by higher tax revenues or larger deficit spending. The first diverts more purchasing power from all of us who, as individual consumers, are able to pick and choose what we want, to government which makes the choice for us. More deficit spending means more inflation with its many evils.

Private industry, by contrast, achieves economic growth through a voluntary process under which more jobs come, not as a creation of the Federal government, but from the investment of capital to increase industry's capacity to produce all kinds of goods and services. This means building more manufacturing plants, more generating stations, more communications networks, more industrial facilities of all kinds—and, through wages to the people who build and operate them, creating the additional purchasing power that is needed so that the new goods and services produced can be sold at a profit.

Just building more industrial facilities like those already in existence is not sufficient. Much more is required to meet our multiple and mounting economic needs. The much more that is needed is the development of means and methods for producing more at less cost—better and more useful products with smaller expenditures of capital and labor for each unit produced.

More production, of better products and services at lower costs, may sometimes come without planned effort but this is a slow and unsure process. Many businesses (the Bell System many years ago) have discovered that the way to speed these desired effects is through organized research—research including fundamental effort in the basic sciences, the design of more efficient productive facilities and the development of previously-unknown products which, like sound movies, television and the transistor in the past, apply sudden new spurs to the entire economy.

Research although charged to expense as a matter of accounting is, like a new manufacturing plant or telephone office, a form of investment in future products. Both take money, and whether the money will be forthcoming depends, in many cases, upon the profits which business earns. Earnings which are just enough to "get by" frequently translate to shortened research expenditures, less expansion, little long-range planning, hand-to-mouth engineering of new plant, start-and-stop construction and a lower rate of growth. Reasonable margins of earnings above the "get-by" level give the latitude and assurance necessary for management risk-taking, for moving

boldly into the future and for building substantially and economically for the long pull.

The possibilities ahead for economic growth are even greater than in the past. Given favorable conditions, in communications alone:

Growth in telephones and usage during the 1960's can well exceed the record gains during the '50s.

Data transmission is already opening an entire new area for major growth. It seems likely that within 15 years or so, machines which can transmit at a speed equivalent to 3000 words a minute will communicate volumes of data even greater than the amount of communications between people.

Then, as now, customers will want and obtain increased calling over wider areas, better grades of service, new types of instruments and other aids to service, the convenience of extensions and the attractiveness of color.

Assuredly there will be many striking new developments from research, among them overseas communications via active satellites for telephone messages, data transmission and television programs.

Bell people well know that financial resources to provide research and expansion, and to do the service job well, are the responsibilities of management first of all. But management can be successful in any business only if government provides the conditions essential to success. These include:

Recognition and encouragement of the primary role of business in furthering economic growth and development.

Tax levels and a tax structure which stimulate business research and plant expansion and recognize that profits provide continuing means to these ends.

Promoting collective bargaining —unprejudiced and unhampered— between equals so that wage increases will keep no more than realistic pace with productivity gains, and permit a share of these to investors and consumers as well.

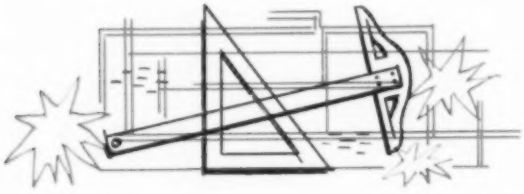
Beyond all, maintaining a stable dollar in the future, and recognizing in the tax laws and in utility regulation the devaluation of the dollar which has already occurred.

The Bell people are hard at work to improve and expand the telephone system and to provide ever more and better service to their customers. Government, especially the state and Federal regulatory commissions, has collateral responsibilities. Together, the members of government regulatory bodies and the people of the Bell Companies can insure that communications growth will continue to be a vital factor in national economic growth with greater well-being and added security for the country as a whole.

The telephone company buildings being built today are better-designed at low cost and more attractive than ever before. This is a sign of our regard for public approval

Better Buildings Make Better Neighbors

Howard E. Phillips, *Building Engineer*
ENGINEERING DEPARTMENT, A. T. & T. CO.



IN OUR BUSINESS WE build over 1,000 buildings every year—nearly 2,000 in one recent year—ranging in size from large skyscrapers to small community dial offices or repeater stations.

We are America's biggest private builder. We have spent over $1 billion for buildings alone in the past five years!

If we are to get our money's worth our buildings must, of course, be efficient in design and economical in cost. But, equally important, they must be pleasing to the eye, fitting in with and enhancing their surroundings and the community, and acceptable to the public. For the impression our buildings make forms a considerable part of the public's opinion of us.

We are doing a better job on the design of buildings today. We look "good" now, but we must continue to look "better." By good design I don't mean eccentric experiments that some architects might want to try out or amateur attempts at modern architecture by unqualified designers. I mean good architecture, which is adapted to the surroundings and does not reflect luxury. It can be the outward and visible sign of our company's regard for public approval.

Low Cost Design

As a regulated public utility, if for no other reason, we must avoid even the appearance of expensive elaboration. Fortunately, we have found that modern architectural ideas and materials lend themselves well to the need for economy, if careful judgment is used. We have found that good building design costs no more than poor design, and many of our best looking buildings are the lower cost ones.

Telephone equipment buildings are

not always easy to design. They are often difficult architectural problems because efficient equipment layouts, for which the building is but the envelope, tend toward rigid rectangular shapes, the proportions of which have little relationship to usual architectural concepts of mass and form. This is especially obvious where a building is to be constructed in a residential area.

For many years, too, we had a requirement that telephone buildings should have one window per bay—this was a standard that was adhered to rigidly by many Operating Companies. This hardly makes good common sense today because we don't generally depend on windows for ventilation. In fact, most of our telephone buildings would be more functional if we had fewer windows in the equipment areas —only enough to meet the fire marshal's requirements. We have found that architects welcome this opportunity to get away from the "one window per bay" requirement. This permits them to enhance the appearance of buildings by placing the window areas in lounges or lunch rooms where the employees may enjoy the view when they are relaxing at their lunch hour, or in office areas where some window area is desirable.

We have another opportunity to relieve the massive appearance of equipment buildings that have unusually high story heights because of the tall equipment frames. In our recently standardized packaged equipment buildings, the equipment area has standard bay dimensions but the space for associated facilities such as power room, mechanical plant, toilets, and lounge areas may be in wings with low ceiling heights to relieve the massive equipment area.

DESIGN OBJECTIVE

The following outlines the design objective for one of our new buildings, in this case the 21-story switching center to be built on 10th Avenue in New York City pictured below. Although the procedures given here apply to this specific building they can be used in varying degrees to achieve design excellence in all building projects large and small.

BASIC REQUIREMENTS

The building will contain central office equipment for both long distance and local service, but will be largely a long distance center. In addition to telephone equipment, other major installations of telegraph, Teletype, television, mobile radio and associated switchboards and power equipment will be housed. Horn type rooftop antennas will direct microwave radio beams to all parts of the country. Also, a large computer may be installed.

FACTORS TO BE CONSIDERED

1. EXCELLENCE IN DESIGN

   Within the limits of size and mass demanded by the type of occupancy and zoning restrictions, the building should have excellence in architectural design.

2. APPEARANCE, FITTING THE SURROUNDINGS

   It should fit in with the current design concepts and planning for this area in the future. The design should improve the area and be a welcome addition to the neighborhood.

3. COST

   Good architecture is good business, but economical buildings are essential to our successful operation. This design should not achieve excellence by the appearance of luxury. Telephone customers should not feel that they are being asked to pay rates to support construction of a "prestige" building.

4. IDENTIFICATION

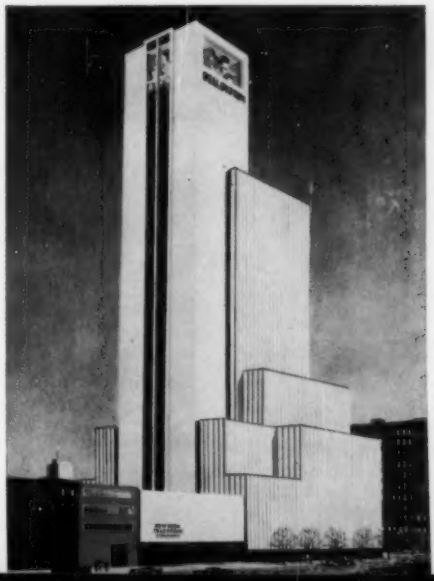
   The building should reflect the nature of our business and be readily identified with the Bell System.

5. LIMITATIONS

   It is necessary that the building be designed with poured concrete exterior walls and a minimum number of windows to provide maximum protection in the event of a wartime attack.

CORPORATE CHARACTER

This building should have an architectural effect that reflects the progressiveness, alertness and leadership of the Telephone Company. It should stress the strength needed to provide communications services in war as well as peace, with a continuing indication that the safety of the nation's communications is one of our basic considerations when we plan new facilities.



Designing for Growth

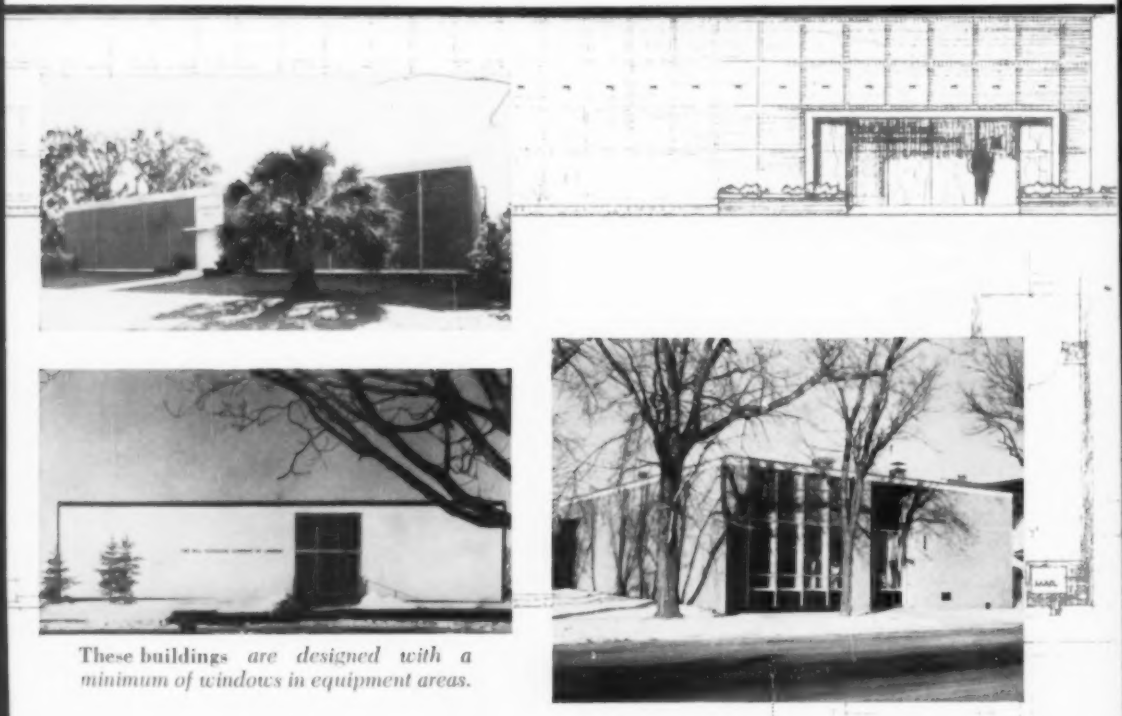
Another complicating aspect of the architectural treatment of telephone buildings is the fact that the ultimate building will usually be considerably larger than the one first built. The building must usually be designed for expansion, either laterally or by the addition of more floors, as the needs of the locality increase; and the final building may well be two to four times the size of the first portion. This raises problems of acceptable architectural treatment for the initial building, the ultimate building, and, in some cases, various intermediate stages.

These varying and unusual requirements all go to make up a collection of information and restrictions with which the architect must work, and with all this we expect him to come up with a good design. Because of these unusual conditions, we must give him the freedom to do a good design job within reasonable cost limits.

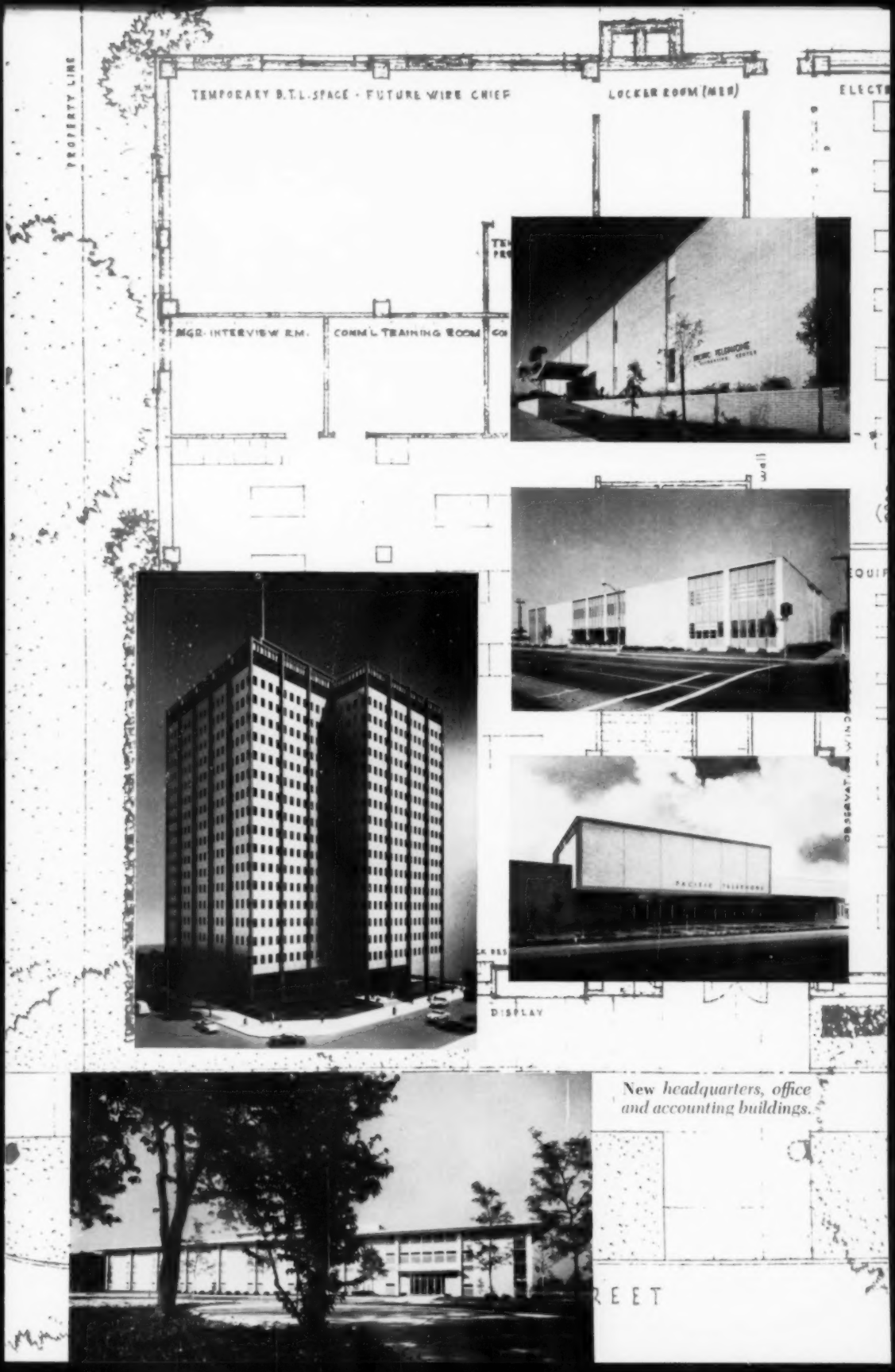
Architects' Services

To do this job properly, the Bell Companies use professional talent to design and plan new buildings. This is a big order when you're building on such a scale but we do most of the design work by engaging experts who are trained to do this work—the private architects and engineers throughout the country. From an overall System point of view this pays off in the long run—it eliminates the big staffs we would need to employ if we did the work ourselves, and permits us to do a good coordination job between owner and architect.

A professional architect is necessary for even the smallest building. Just as it would be foolhardy to treat a mild case of pneumonia without a doctor, just so "do-it-yourself" architecture on a small building is poor economy. In fact, since about half of the Bell System's more than 15,000 buildings are small structures, good small building



These buildings *are designed with a minimum of windows in equipment areas.*



New headquarters, office and accounting buildings.

design is especially important to us.

Edward Stone, who designed the award winning Brussels exhibit building, said recently on a TV program, "We're building in America without any plans." Let's not be accused of this in the Bell System. Let's be the leaders in setting the public taste.

Consulting architects are retained in New York as a service to the Operating Telephone Companies for review of specific projects. These jobs are reviewed in the early planning stage so that the consultants' ideas may be incorporated in the working drawings.

Another method which has been developed to encourage better looking buildings is the Awards Program which was started in the Bell System last year. Honor and Merit Award certificates are presented to architects for good design at reasonable cost. Factors which are considered in the judging are appearance, architectural excellence, ability to fit into the surroundings and reasonable cost.

Zoning Requirements

It is obvious that our neighbors will like us better if we can keep within the spirit as well as the letter of protective measures such as zoning ordinances. The Telephone Companies avoid applying for exceptions, unless there is absolute necessity. Judgment in selecting sites, and ingenuity in avoiding the need for exceptions, will be amply repaid in finer community relations.

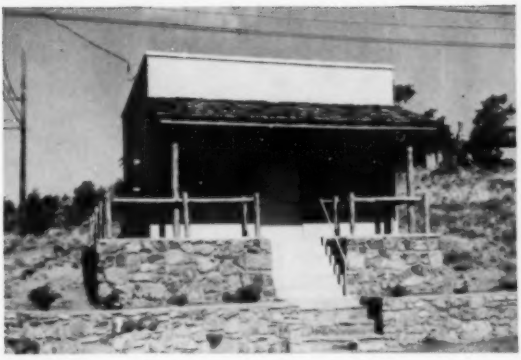
Some zoning ordinances permit telephone exchanges within commercial districts only and exclude them from residential areas. Yet, quite often a new wire center must be located in a residential neighborhood and a request for a variance is unavoidable. In our business, to serve our customers we must, of course, be among them.

Off-street parking is another provision of zoning ordinances that often requires arriving at an understanding with the municipal officials as to reasonable requirements. Off-street parking is generally calculated in proportion to either the floor area of the building or its estimated population. The requirements vary depending upon the use classification of the building. Quite often we have experienced a problem as far as classification of telephone buildings within the uses outlined in the ordinances. An ordinance rarely has a use classification for the purpose of establishing reasonable off-street parking requirements for a telephone exchange, with the result that there is uncertainty as to what the requirement will be in advance.

Generally, the Telephone Companies are now attempting to acquaint local zoning officials with their problems so that when either a new zoning ordinance is passed or an amendment is made to the existing ordinance, reasonable provisions can be put in to govern the requirements for telephone buildings. Many telephone buildings have large equipment areas where few people are required, thus there is little need for large parking areas at many of the locations.

Aerial and Underground Cable

We have discussed buildings at some length. Another important part of our business that the public sees is the aerial cable and wire distribution system. This exposed overhead distribution system was developed to provide economical and practical telephone service for a rapidly growing and expanding nation. However, the Telephone Companies are now very much interested in placing cable and wire



The Bell Telephone System
Honor Award for Excellence in Architecture
at Low Cost, with due regard for Simplicity and
Appropriateness to Site and Environment for
Terrace Exchange Building – Omaha, Nebraska
Wallace and Burrill, Inc. – Architects

Some award winners. *Our program is designed to produce attractive buildings at low cost. One of the award certificates is shown above.*

Design *permits added stories on these buildings without loss of original good appearance.*

underground. There are two chief reasons for this. One is a reduction in loss of service due to storm damage and the other is to help improve the appearance of the community. The Telephone Companies are encouraging builders and developers to consider, and include in their planning, underground telephone facilities.

Prohibitive costs have been the delaying factor to date in getting aerial distribution underground. However, new technology and the development of teamwork between the utility, the builder, and the community officials are beginning to trim some of these costs. With modern machines, methods and materials it is believed that outside plant can be placed underground at costs comparable to aerial construction in many urban areas. This cannot be accomplished overnight, however. The very real problem of coordination and cooperation of all interested parties as well as the many technical aspects must first be solved.

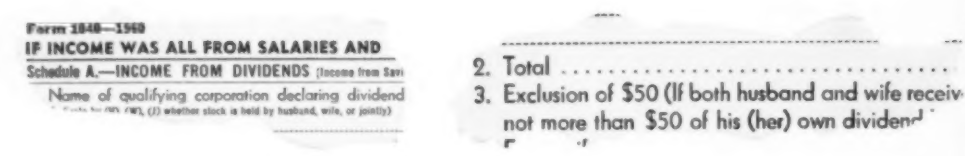
Looking Ahead

With each new building, we reflect our corporate character. We are second to none in communications and its related research, and our architecture should reflect this progressive organization. Many times we are confronted with people in a community who demand that our little community dial office have a traditional look. It is not usually necessary that the building be disguised to look like a residence. If the architectural character, the scale and proportion of its elements, the choice of exterior materials, and the landscaping are done with care, the building will take its place in the surroundings and enhance the community.

Even *a garage can be attractive.*

An Editorial

Labels or Loopholes?


Form 1948—1568
IF INCOME WAS ALL FROM SALARIES AND
Schedule A.—INCOME FROM DIVIDENDS (Income from Sav
Name of qualifying corporation declaring dividend
2. Total
3. Exclusion of $50 (If both husband and wife receiv
not more than $50 of his (her) own dividend

THE TAX REFORM measures that have been proposed in the President's message seem to pull in opposite directions.

On one hand, there is talk of the need for tax concessions to business in order to encourage long-range economic growth (i.e., investment tax incentives). Basic to this approach is the belief that tax concessions are an effective method of encouraging business expansion and consequently economic growth.

On the other hand, there is the proposal to repeal the four per cent dividend credit and the $50 dividend exclusion. Those who support this proposed elimination of these tax adjustments call them "loopholes" despite the fact they also are incentives to business expansion and growth.

What exactly is a tax "loophole?" Any deviation from the original tax law which makes a concession to taxpayers may be labeled a loophole. But the label doesn't prove much since there are hundreds of such deviations in the tax code.

Actually, the repeal of the dividend credit is aimed at "concentrated" shareownership with the implication that this group is not shouldering its share of the general tax burden.

Undoubtedly, the dividend credit does reduce the impact of taxes on this "group," but more than likely, it does not reduce the impact enough.

In other high growth rate countries, the need for substantial dividend credit has been recognized as essential to increased investment and greater economic growth. Canada adopted a 10 per cent dividend tax credit in 1949 and raised it to 20 per cent in 1953. West Germany has a 25 per cent dividend credit and Japan a 17 per cent credit. A number of other countries levy no tax at all on dividend income.

Implicit in the attempts to repeal the dividend credit and the dividend exclusion is the suggestion that few people of moderate income would be affected. This is certainly questionable.

The basis of this suggestion seems to be the view that only the "wealthier" person owns stock. This was a debatable point ten years ago when there were no statistics either to substantiate or disprove that possibility. But today, statistics show that the small investor is definitely an important part of the investment picture.

- Stock ownership has almost doubled in the past ten years. A University of Michigan Research Center reports that a greater part of this increased ownership occurred in the moderate and low-income sectors.
- Of the total twelve and a half million shareholders in publicly owned corporations, three and a half million have family incomes under $5,000 a year; six million have incomes ranging from $5,000 to $10,000.
- Fifty-eight per cent of the total market value of all stock publicly held by individuals is owned by those with incomes of $15,000 or less; 36 per cent of it is owned by those who have incomes of $10,000 and under.

As Rep. Curtis (R-Mo.) remarked in the last Congress, the four per cent credit plus the $50 dividend exclusion were "among the incentives which have encouraged the low and middle income groups to invest their modest savings in America's business."

Conversely, a repeal of these tax adjustments would "discourage" investment by low and middle income groups. This in turn would have a negative effect on growth. For with our progressive tax rate structure, which limits the available investment of capital in higher income groups, business has had to rely more and more on the increasing number of small investors for its capital growth.

More than half of AT&T's 1,911,000 stockholders own less than 50 shares.

One result often overlooked in the arguments for the repeal of the exclusion and the credit is the effect it would have on those of retirement age. Of the total twelve and a half million shareowners two million are of retirement age. More than 400,000 AT&T shareowners are 65 years and older. Many of these persons depend on dividend income.

It has been estimated that the repeal of the dividend credit and exclusion would increase Federal revenue about $450 million annually. Straight mathematical analysis may suggest this figure, but chances are the actual figure would be somewhat lower. Here's why:

- The potential growth created by moderate and low income investment may be negated, thus affecting ultimately the government intake from dividend income.
- High tax rates without the benefit of dividend tax deductions encourage individuals with substantial means to invest in tax-exempt securities such as municipal bonds.

As it is, shareowners in American business are paying what is often described as a "double tax" on dividends. First, the corporations that have most of the investors in this country pay a 52 per cent tax on their earnings. Second, the part of the earnings paid in dividends is taxed again—through the personal taxes paid by shareowners. Other forms of personal income—wages, salaries, fees, interest payments—are not subject to such double taxation.

No one disputes that taxes are essential if a government is to carry out its many responsibilities. But in the never-ending process of reviewing our tax structure, and its various deductions, credits and exemptions, one should take note that what may be labeled a loophole "on one hand," may be a stimulant that helps to attain the economic growth the "other hand" is reaching for.

SPEECH . . . *is a mirror*

of the soul;

as a man speaks,

so is he.

—Publius Syrus

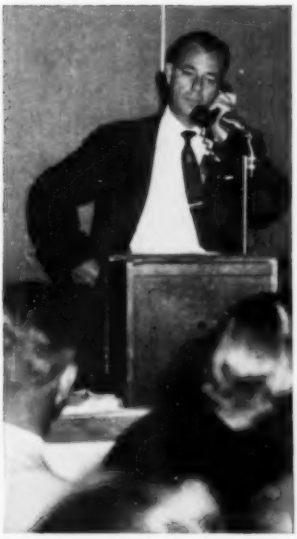
More and more our business is feeling the need for effective speakers who can explain and interpret company objectives and policies to the public. The Bell System is growing a good deal faster than the economy as a whole. Our enterprise is providing services of ever-increasing utility and convenience to the customer. And, yet, this very business vitality creates dynamic changes which oblige him to change lifelong telephone habits. Because we work in the business, we can see the need for these changes. We understand the reasons for them. But the customer has neither our insight nor our objectivity. Perhaps this is why he sometimes challenges our motives, questions our abilities and fails to see the eventual benefits accruing to him from the progress we create. Certainly, the customer deserves complete explanation of the changes we are making in his name. And this is one of the exigencies of the business today – to develop the communicators who, through sincere, intelligent talking, can bring about increased understanding and trust. . . .

Bell System *speakers in action: opposite page, Earl Blaser, Ohio Bell–top, John Prell, New Jersey Bell–immediately above, Miss Claire Trussell, Bell of Pennsylvania.*

SPEECH...

Skill in speaking is perfected by nature, art, and practice
— Quintilian

Open house *gives excellent opportunity to tell our story, as Barbara Gaca, Illinois Bell, is doing above.*



Telephone matters *are discussed by (left to right) A. T. & T. President F. R. Kappel; L. L. Gracey, Mountain States information manager; Western Electric President H. I. Romnes.*

In the Bell System the top echelon of management is providing the impetus for more effective public speaking. They are talking often . . . they are talking forcefully . . . and they are being heard. Furthermore, increasing numbers of telephone people at all levels and in all departments are speaking out about the important facets of the business. . . . And they are talking from honest convictions earned by a thorough understanding of the subjects on which they speak. . . .

We try *to meet often with customers in the local community—young as well as old—not only to talk and answer questions about our work, but also to listen to what the people we serve have to say. Edward Stakenas (left), Illinois Bell, shows fifth grade students in schoolyard some equipment that helps him work safely.*

SPEECH...

Of the modes of persuasion furnished by the spoken word there are three kinds. The first depends on the personal character of the speaker; the second on putting the audience into a certain frame of mind; the third on the proof...of the speech itself.

—Aristotle

The public speaking activity in the System has been growing rapidly in recent years.

It now reaches an annual audience of over nine million. Programmed speaking engagements by the more than 2,500 organized speakers account for a major portion of this figure. But quantity brings with it a need for qualitative balance. . . . And there is a concerted effort under way to improve the effectiveness of the medium . . . strengthen administration . . . sharpen up on speaker selection . . . improve training techniques . . . search out the important audiences we really need and want to talk with.

SPEECH...

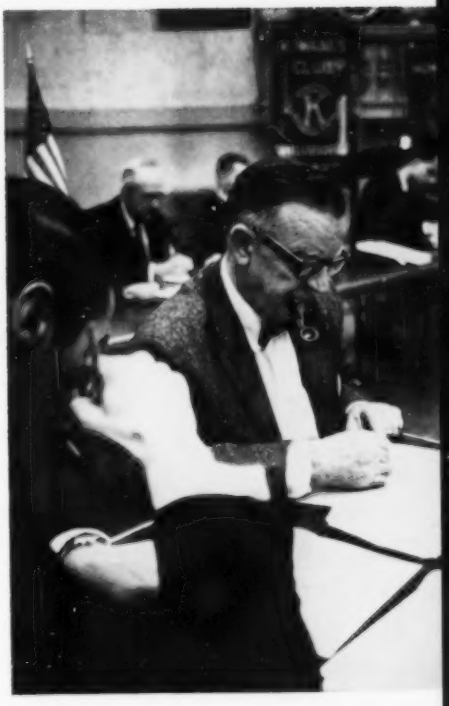
The proofs and demonstrations of logic are toward all men indifferent and the same, but the proofs and persuasions of rhetoric ought to differ according to the auditors.

— Bacon

Attitude *survey questionnaires are filled out by Willoughby, Ohio, Kiwanis members before Telephone Company talk.*

Administrators of the speaking activity look to research for the information necessary to help them decide what subjects customers want and need to hear about . . . do a better job of matching the right subjects with the right audiences . . . prepare their material in a manner best calculated to improve understanding. Recent audience reaction studies conducted by the Wisconsin, New York, Pennsylvania and Ohio Companies have produced much helpful information – but, much more is needed.

"Profits and Progress" talk, *based on 1959 Bell System Profit, Performance and Progress Study of regulated and non-regulated industry, is given by Earl Blaser, Ohio Bell.*



After hearing talk, *Kiwanians fill out second questionnaire. Before and after attitude differences measure talk's effect. Center, right, is Robert Hardgrove, real estate agent.*

Depth interviews *are conducted several days after talk, with individuals selected at random from the audience. Here Mr. Hardgrove is shown being interviewed at his place of business. Survey results showed talk scored well in cost, company and profit attitude areas.*

SPEECH...

Well, God give thee the spirit of persuasion, and him the ears of profiting, that what thou sayest may move, and what he hears may be believed. . . .

— Shakespeare

Particularly significant at this stage of the System speaking activity's growth are the efforts to improve training techniques. This is especially true in those Companies with growing volunteer speaker organizations. As a result, comprehensive speaker training programs are being developed . . . programs that help the individual grow, built on the premise that effective speakers are made, not born. . . .

Drs. Richard Mall *(left) and Keith Brooks (right), assistant professors of speech, Ohio State University, conduct advanced Ohio Bell speaker training. Course is so successful Ohio Bell has expanded program to include professors from several universities.*

Mike McCabe *talks telephone communications to a New Jersey audience with vigor and sincerity.*

These are training programs that

- begin with an understanding that good speakers communicate through live interaction with their listeners. . . .

- develop the skills required for careful speech preparation and

- result in effective extemporaneous speakers who can present their material in a natural and animated manner. . . .

"**Relate subject** *to audience interests . . ." Kay Westendorf, Illinois Bell, coaches full-time speakers.*

"**One of our** *new line of products and services . . ." Bill Duncan practices before fellow New Jersey Bell speakers.*

Needed: a communications system tailored to the specific needs of the modern businessman farmer. The answer, Farm Interphone . . .

A New Voice For The Farm

Jack W. Basford, *Staff Representative*
MARKETING DEPARTMENT, A. T. & T. CO.

TODAY, COMMUNICATION on the farm is more of a problem than ever in the past. Time was—not so many years ago when farm life was simpler and the average farm much smaller—when the dinner bell and stout lungs could take care of at least the basic communication needs.

But in recent years farming has changed and changed dramatically. The typical modern farm is not only larger than most farms used to be; it is also a complex, highly mechanized business. As a result, fast, efficient internal communication has become as important to the nation's 3,700,000 farmers as to any other businessman.

It was to fill the very real and specific internal communication needs of this large and important group of our customers that Farm Interphone was developed. Of all the services offered in recent years, few have been tailored quite as closely to the specific needs of a large market. It is in every sense of the word the farmer's own system. Since the system's earliest development stages, he has participated in determining what features the Farm Interphone should have.

The story of Farm Interphone really begins in Iowa in 1955. Telephone people there were concerned about the internal communications problems of their farmer-customers. There simply wasn't an existing communication system that fitted the farmer's needs. Something special was required; so

Northwestern Bell people in Iowa designed a "key telephone package" which they installed on a trial basis on 12 Iowa farms.

The resulting reception was so enthusiastic and comments so encouraging that Northwestern Bell (and subsequently the Bell System) undertook a survey of its rural customers to find out in detail what their internal communication requirements were and how the Bell System might meet them.

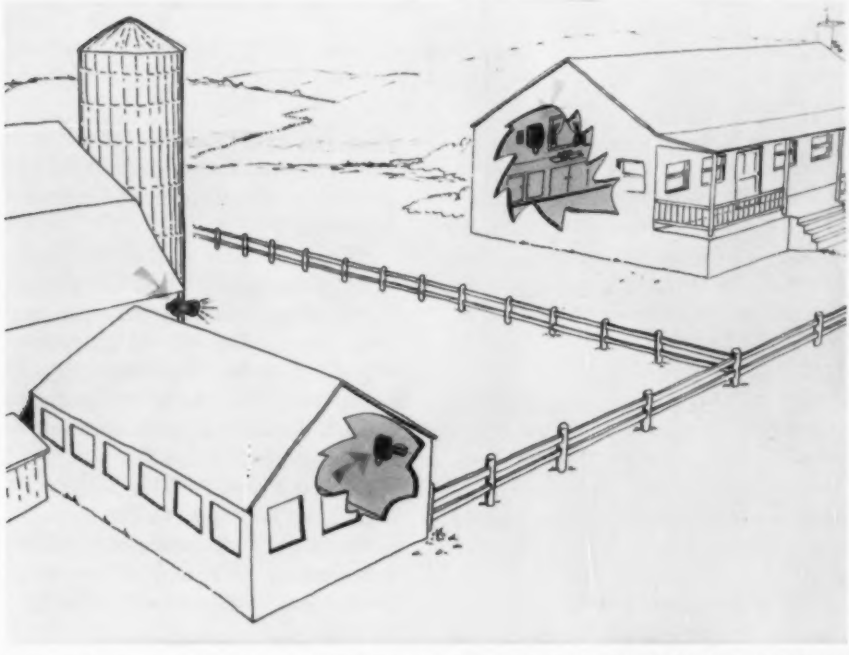
What Was Needed

Farmers told us that they were very definitely interested in farm building extensions, intercoms that they could use without interrupting their work, monitoring so they could hear what was going on around the farm and loudspeakers for conversation and voice signaling.

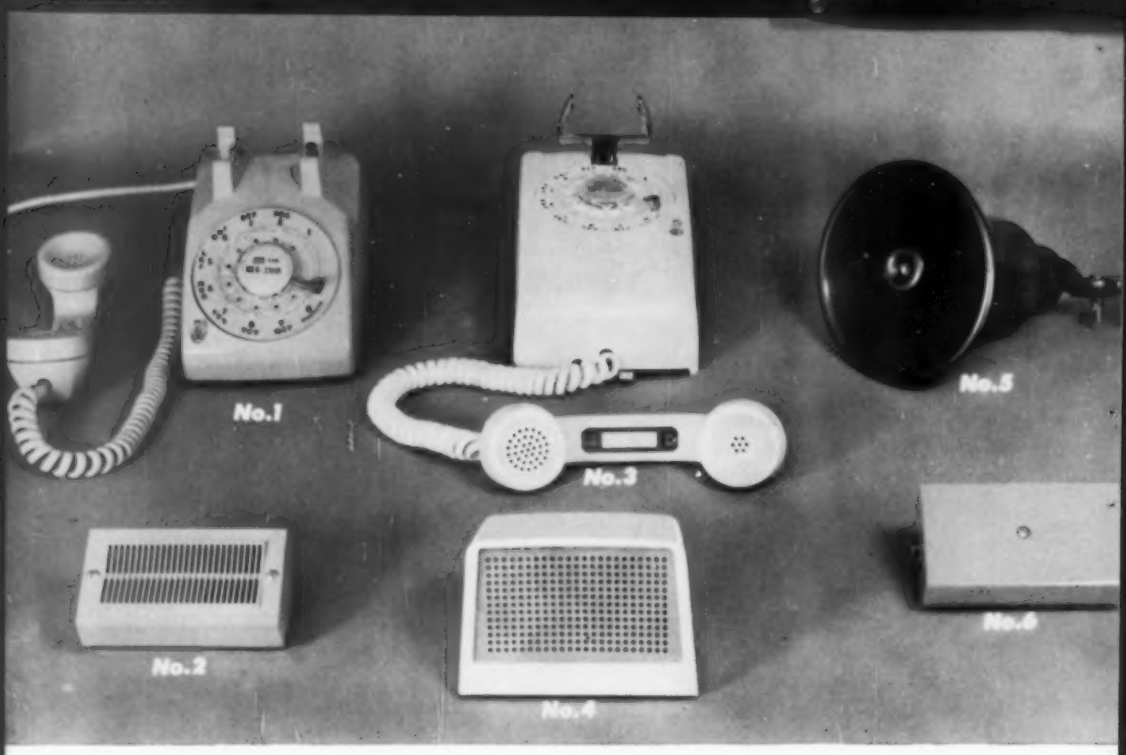
In short, farmers said they needed a communication system that would help them run their farms more efficiently and in addition provide comfort and convenience compatible with their improved standard of living.

An indication of how badly such a system was needed was the variety of homemade communication devices the survey revealed. Frankly, we were amazed and sometimes even amused at the ingenious inventions that farm people used to signal each other. Some used clotheslines to carry messages, some used mirrors to flash light back and forth and others used a variety of bells and gongs.

By the time the study was finished,



The main components *of Farm Interphone are shown in typical use in the drawing above. It permits either private or "broadcast" communications with hands-free answering.*



Farm Interphone *equipment: (1) Master station telephone usually installed in farmhouse. (2) Master station loudspeaker for intercom and monitoring. (3) Second telephone for barn or other outbuilding for intercom or regular use. (4) Accompanying speaker-microphone. (5) Long-range two-way loudspeaker for outdoor use. (6) Special ringer which broadcasts telephone ring. Additional equipment (including Princess) is also available.*

it was apparent that an entirely new system had to be developed to meet the special needs of the farm family. Teaming up to meet the problem, A. T. & T., the Bell Laboratories and the Western Electric Company went to work.

A New Concept

The result was the development of Farm Interphone, a new concept in farm communications. Now, for the first time, the handling of regular calls, intercom calls and monitoring service was possible in *one* highly versatile communications system based on the use of the household telephone.

After testing and perfecting Farm Interphone in various parts of the country, we were satisfied that it fulfilled the basic purpose for which it was developed—to save man-hours and to improve the efficiency of farm management.

Then came June 1960 — The American Agricultural Editors Convention. Farm Interphone was presented and demonstrated in all its glory—and they liked it. Articles started appearing all over the country. Comments such as these were sprinkled throughout the stories.

Poultry Tribune—"The telephone—already an important tool to farmers—becomes even more valuable with the introduction of a new 'Farm Interphone' system developed by the Bell System . . ."

Ohio Farmer—"I predict Farm Interphone will be so popular that there

will be thousands of them sold . . ."

Farm Journal—"A new telephone system for farms lets you take a call right on the job. There is no need to drop your work, run to the house and track up the kitchen floor. And your wife doesn't have to chase out to find you . . ."

In addition, NBC "Monitor" interviewed a Farm Interphone user and carried the discussion over its nationwide network. An independent agency provided a three-minute radio demonstration of the product to over 400 radio stations throughout the United States. *Farm Interphone had passed the test*—It had been accepted by a most critical audience.

The editors verified that the service was truly "farm designed." This endorsement was substantiated by comments from farm families who had used it such as: "It saves us all kinds of time and running every day. It's a real convenience. We sell our eggs and now we never miss an order . . ." ". . . It's worth a million dollars. I just call Joe without leaving the house and chasing from building to building . . ." ". . . It enables me to know just about what the activity is in the barnyard at any given time of day."

It became apparent early in the planning of the marketing program for Farm Interphone that something special was needed to demonstrate this new service in the rural market—something that would let the farmer evaluate what it would do for him and mentally try it in his operations.

Why not produce a movie—Call it "A Voice for the Farm."

We did. Sound — color — the whole works!!

Not only does the film create interest in the product but because of the

Using *Farm Interphone, farmer can talk with house via long-range two-way loudspeaker microphone while he is working.*

Introduction *and demonstration of Farm Interphone to the American Agricultural Editors' Association was made in Memphis last summer. They endorsed it with enthusiasm.*

setting and matter-of-fact approach our farm customer finds it easy to identify himself with the "Mr. & Mrs. Roberts" portrayed in the film. And when we solve the Roberts' problems by installing Farm Interphone he realizes we really solve his communications problems at the same time.

Many additional items were produced—such as sales brochures, a "How to Promote It" booklet, suggested advertising, talks, direct mail plans, slide presentations, a sales training course and customer instruction material. All were designed with the farmer in mind.

As a result of the years of research and effort, we can approach the selling of this new service with confidence. The product is outstanding and the market is obviously ready. In other words, we are now able to furnish a modern communications system to thousands of topflight farmers who really mean business.

Farm Interphone is another step forward in meeting the communications needs of our rural customers.

By giving the guidance counselors a new perspective on the modern operator's job, this program has increased the supply of bright, quick, young job candidates

A Workshop For High School Counselors

Eugene E. Mark, *General Traffic Personnel Supervisor*
SUBURBAN AREA, ILLINOIS BELL TELEPHONE COMPANY

BUSINESSMEN ARE quick to recognize the pressure of competition when another company outbids them on a desirable sale. Harder to recognize, but present nevertheless, is the competition between employers for people—the search for high quality employees in today's labor market. In both instances, success in meeting competition depends to a very large extent on refining and polishing time-proven techniques and introducing new methods to meet the changing conditions.

So it has been in the telephone business. Our recruitment in the past has relied considerably on employee referrals and voluntary applications—and, if matters were serious, advertising. These methods have merit as part of an overall program. However, reliance upon these media alone will not provide quality employment. The kind of people we need must be sought for, competitively. This calls for turning to the high school as the primary source. The Traffic Department has learned to draw heavily from the high schools for candidates for employment as telephone operators. It has been able to establish a valuable competitive advantage in the use of high school students as part-time employees before graduation, thus offering employment to the group well before other employers.

But, as this program was extended, it exposed a rather uniform attitude among high school counselors toward the job of telephone operator. They were inclined to view the job, without

knowing much about it, as less desirable, less challenging to high school graduates, than many other jobs which they categorized rather generally as "clerical." Therefore, five years ago Illinois Bell began a high school guidance counselor workshop program designed to acquaint counselors with the work of telephone operators and the company that employs them. The program, similar to some already in operation in other Associated Companies, has worked well at Illinois Bell. Perhaps sharing our experiences will be of interest to others.

The Workshop

Early each year, counselors are offered a six-to-eight weeks summer employment experience with the Telephone Company in which they learn first hand about working conditions and job opportunities in all departments. A basic and a requisite part of the program is that each counselor train and work as an operator. This experience covers four to five weeks. Then, working in pairs, they spend the remainder of their time assessing work operations and learning about other facets of the business from people in other departments. When the program is finished, the counselor prepares a critique on her experience. These papers, along with informal discussions, have been most enlightening and rewarding. The counselors are uniformly enthusiastic and appreciative.

In order to realize the importance of the counselors' reactions to the workshop program, it is necessary to understand the position they hold. The guidance counselor is playing an increasingly important role in education. Students look more and more to her for advice and assistance. Such questions are asked as, "Should I continue? What courses should I take? What kind of a job should I look for? Will I find what I want in this or that job? Does their company have a good college employment program?" Although the counselors are already well prepared to aid students in planning their

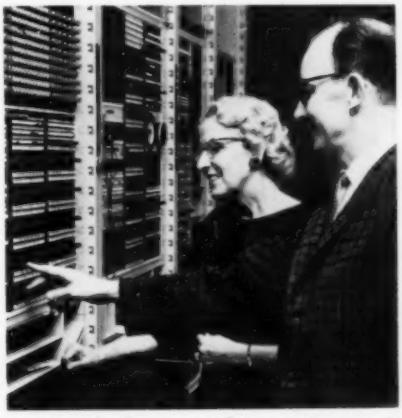
Miss Leotta Hampton, *counselor at Arlington Heights, Ill., High School, shared in Illinois workshop program. On the next page are shown some of her experiences.*

formal education, the workshop experience is generally their first real look at industry or job opportunities in industry. Most of them feel a real need to know more about the many jobs that are being offered today in order to give adequate guidance to the students. The workshop shows the counselors what business people are like, how they think, what kind of people they want to hire. Thus the workshop answers the counselors' needs for career guidance information as well as our own needs.

Greeting *Miss Hampton at the beginning of the workshop program are the chief operator and district traffic manager.*

Learning *to operate the switchboard and actually working as an operator are most important parts of workshop experience.*

Meeting *other telephone company people, such as this service representative, occupies the remainder of the program.*



Seeing *telephone switching equipment is more meaningful when an expert, here a wire chief, explains maintenance center.*

Counselors' Reactions

The counselors contribute to the benefits of the program themselves by offering many comments and suggestions about the job of a telephone operator. They pay considerable attention to training methods. "It pleased me to note that training techniques in industry are based on sound educational theory and practice," is a typical comment. There is some criticism—for example, that application of the techniques is too rigid—not sufficiently flexible to meet the needs of the individual. As one of the counselors quoted an instructor, "The book says we should learn this now and something else later; so that's what we better do. . ."

From the first program on, counselors have reacted to "supervision hovering over operators." To the counselor, it is much more than the physical presence of hovering supervision, it is, "Lack of freedom and lack of opportunity for the operator to use her own initiative." The feeling on this score is uniformly strong—they feel that superior and responsible employees are bound to resent the implication of so much direct supervision. It is interesting to note that while this reaction is still prevalent, close or hovering supervision has been markedly reduced in the past year or two. The counselors

Therese Greeley, *high school senior and part-time telephone operator in the Cicero Information office, was recommended for operator job by her guidance counselor. Working after school and part of the week end still allows her enough time for school activities.*

Working "day" *for Therese only begins after school when her classes are over.*

Conferences *with chief operator help her adjust to combined school and job needs.*

applaud the steps now being taken to broaden the operator's area of judgment and to eliminate the problem of close supervision.

Apparently, some of the counselors who have taken part in the workshop used to think we were not very aggressive in competing for good people. Some of them also challenged the Company in regard to advertising as an employment medium. ". . . it merely says you are in trouble—will take what's left—everyone knows you hire women . . ."

A New Understanding

Most gratifying—and significant to us are the great number of comments which reveal a new understanding and respect for the operator's job. Here are some of their typical observations: "I had no idea the operator's job was so interesting. They ask why we have not done this sort of thing before—why we have allowed them to remain uninformed—"the job seemed so prosaic." One counselor said, "In the past I have told the girls who fear of having difficulty with pre-employ-

Therese likes *being an information operator. "I enjoy helping people," she says. Visualizing each person's face helps her give individualized service.*

Snack *with friends in the Company cafeteria gives Therese a pleasant "break."*

ment tests that they can always get a job as a telephone operator. Now I feel our good students should be informed about all the fine opportunities the Telephone Company has." Another commented, "I never knew you were interested in students who intend to go to college—I think the idea is tremendous."

The workshop program has demonstrated to us that the counselors must understand our job and our objectives in order to recommend the kind of people we need. After the workshop they can say to their students, "I've been there, I know what it's like in the business world, I can tell you." Counselors indicate that the kind of people we want *are* available in the schools.

The counselor can provide an excellent made-to-order pre-screening operation. Those who have been through the workshop experience realize this and are anxious to do an effective job. One said, "We can tell you all about a student's work and attendance patterns—those are the patterns that will carry over to the job." Another offered, "You need capable people . . . please call on me . . . I'm sure I can help." Still another said, "I'd like to see our school provide people with leadership potential for Bell. . ."

We must rely heavily on applicants whom an informed counselor recommends. The counselors' experience with us puts our job opportunities in true perspective and assures active assistance in our recruiting effort.

Other Benefits

The high school guidance counselor workshop program is essentially a plan to meet an employment need in a competitive market, a job it does exceptionally well. But such a continuing counselor program has resulted in more than direct employment benefits. It is also raising the prestige of the telephone operator. During the past few years since our workshop program began, a substantial number of high school guidance people, with significant influence over the attitudes of young people soon to graduate from high school, have had a close association with the Telephone Company. They have been impressed by the fact that applicants are carefully screened before employment is offered, that training is sound and thorough, that practices and procedures are designed to give pleasing service to the customers and that the measurements of the quality of the service are based on what the customer, and not just the Telephone Company, wants. And, closer to home, they have learned that the Company's employment policy encourages educational achievement. Part-time employment with the Company is arranged so that the high school student will keep her school grades up, will graduate from high school and, if she chooses further education, can, in many instances, help finance it by continuing part-time work as she is able. This factor makes a favorable impression on the counselors who are concerned with the welfare of their students, and gives a needed boost to our search for quality workers.

Much Remains To Be Done

However, in spite of the many benefits of the workshop program, it would be ridiculous to assume that a high school counselor program is in itself the complete answer to the effort to recruit quality people. Much is being accomplished by it, but much else remains to be done. The present public concept of the operator's job is based

on opinions that are unrealistic—employees, management, school teachers and the public in general underrate the job and the operator in the job. Furthermore, we are facing a changing operator job that will require much greater skill in dealing with the customer—a skill largely dependent upon the employee's judgment, attitude and job interest. A negative attitude regarding the value of hiring high school girls on a part-time basis can be and, in many cases, is a serious handicap to quality employment. This attitude seemingly stems from magnifying the problems of part-time employment, the amount of management time involved in programming and scheduling and, sometimes, a fear of excessive losses.

Needed — A New Attitude

Consequently, a close look at the situation may well reveal the need for further education of management people as to the content of today's telephone operator job, with emphasis on the need for top quality people and the increasing competition for them in the employment market. This would require management people to extend themselves in the way of time, effort, and personality. The additional time and effort needed for this approach to employment must be provided. If enough time is made available, the future will see a fortunate combination of superb service, morale, and productivity. We must be sure that those concerned understand thoroughly just what today's employment philosophy is and why it is so very important.

Today, service requirements go beyond the technically correct and efficient. The objective now is service which is of the highest value and usefulness measured by the customers' standards. These standards require more and more that the modern operator have greater latitude of judgment and action. Effective use of this latitude cannot be prescribed or just taught—it comes only with qualified people who have real job interest. It comes with the best that the high schools have to offer. All of the benefits of a recruitment program involving the hiring of high school students on a part-time basis and a counselors' workshop are needed, now, more than they ever were before.

The cost of the counselor program is modest—the value can be great.

Successful *completion of telephone operator training is celebrated at a graduation tea attended by the trainees, their mothers and their Traffic Department supervisors.*

This new microwave system is an outstanding example of how long-range planning pays big dividends in terms of future service needs of our customers

TH Opens New Vista in Microwave

Richard D. Campbell, *Point-to-Point Radio Engineer*
ENGINEERING DEPARTMENT, A. T. & T. CO.

WITH LITTLE or no fanfare, coming as it did at a time of such new Bell System service offerings and new development projects as WATS, TELPAK, electronic switching, dataphone, Bellboy paging service and satellite communications to mention just a few, the first installation of the newly developed TH microwave radio relay system was placed in service on the route between Prospect Valley, Colorado (near Denver) and Salt Lake City, Utah on March 27, 1961.

This is very much in contrast to the widespread publicity and demonstrations in 1947 when the first experimental microwave system (TDX) from Boston to New York was publicly demonstrated or in 1950 when the first TD-2 system from New York to Chicago was opened. The reason for the lack of fanfare in placing the first new TH system in service is simply that the use of microwave radio as a work horse has come to be an accepted fact. Even though it has only been used extensively for domestic service since 1950, the pace of progress is such these days, that microwave is already an old story in the Bell System.

Over the past decade, microwave routes of the Bell System have spread throughout the country. Today these facilities total 44,000 route miles and carry over 77,000 miles of television circuits and 30 million miles of long-

distance telephone circuits. This represents 90 per cent of the total television circuit mileage and 35 per cent of the long-distance telephone circuit mileage in the Bell System plant.

However, the demand for long-distance service since World War II has been so fantastic that it became evident, even as early as 1952, that a number of the backbone TD-2 routes would shortly reach their maximum capacity (six two-way broadband channels at that time) and that increasing difficulties would be encountered in the years ahead in finding suitable interference-free routes into the major cities and industrial centers of the country. Later that same year, the Bell Laboratories undertook the development of a new long-haul microwave system to supplement TD-2. The new TH system which was put into service in March is the direct result of that development effort.

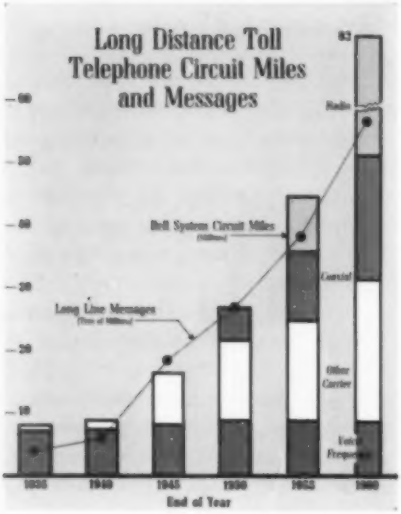
TH Microwave *being installed on TD-2 route. Shields are placed over system's combining networks as protection from ice.*

Meeting the Need for Expansion

TH microwave is a long-haul heavy route system which is destined to carry a large part of the intercity circuits needed for expansion during the next decade or so. In addition to the usual types of long-distance services, TH is capable of handling high definition television signals suitable for intercity theatre network service, should a need for this type of service develop. The TH equipment and associated antenna arrangements can be used either to augment the capacity of existing TD-2 routes or for new route construction. Important economies result from sharing the station sites, towers, antennas, power supplies and buildings with the TD-2 installations.

The present installation consists of two eastbound and three westbound broadband channels and two two-way narrow band auxiliary channels (one regular and one protection). Of the five broadband channels, two will be used for telephone service, one for westbound television service and two for protection purposes. The narrow band auxiliary channels are used to transmit order, alarm and protection switching signals and to provide telephone service facilities to the stations along the route. This route, consisting of 14 repeaters and the two terminal stations, has a total length of 477 miles.

The TH system was developed to meet Bell System transmission objectives for 4000-mile circuits. Its design is based on the experience of the Bell System in the operation of microwave facilities and use of the latest available microwave techniques. The broadband channels are capable of handling signals occupying a baseband ten megacycles wide. A pair of channels, one in each direction, will carry 1860 telephone circuits, more than three times



the capacity of a pair of TD-2 broadband channels.

The Result of Long-Range Planning

Development of the TH microwave system is the result of long-range planning in the 1940's. In a general hearing before the Federal Communications Commission in 1944 on the allocation of frequencies to non-government services, the Bell System asked that blocks of frequencies in the microwave range be designated for domestic fixed service. This resulted in experimental allocations, followed in 1949 by the allocation for commercial common carrier service of the bands 3700-4200, 5925-6425 and 10,700-11,700 megacycles which are available today.

The TH design provides very efficient use of the 5925-6425 mc frequency band. A total of eight two-way broadband channels, two of which will be reserved for protection, can be operated along a route in addition to the two two-way auxiliary channels. The close spacing of adjacent channels is facilitated by segregating all the transmitters in one end of the band and all the receivers in the other end, with a small guard band between. Also, adjacent channels are arranged for alternate vertical and horizontal polarization of the transmitted signals, a scheme which is similar to the use of polarized light for three-dimensional movies. These two features minimize the crosstalk between channels and simplify the design of the channel separation filters.

Important Economies

Since the TH system uses frequencies in the 6000 mc common carrier band, well removed from the 4000 mc TD-2 band, the TH system may be used on TD-2 routes without interference. As mentioned earlier, this arrangement provides important economies over the construction of new TH routes, since no route survey is required and sites, towers, access roads, and power connections are already available. Also, existing buildings can be used, though usually new extensions will be required.

At TD-2 stations equipped with the horn-reflector antennas, the only changes required in the antenna sys-

First *TH leg went into service in March. It is superimposed on the TD-2 route.*

Transmitter *bays extended for test show how TH equipment racks slide out from bays for easy maintenance from two sides.*

tem are the addition of the necessary systems combining networks to couple the TH waveguide to the vertical waveguides up the tower. At TD-2 stations where delay lens antennas are used, the addition of TH requires replacement of the antennas with horn reflectors, a change from rectangular to circular waveguides up the tower and installation of the system's combining networks. The use of TH on existing routes as compared to new TH route construction should result in very substantial savings.

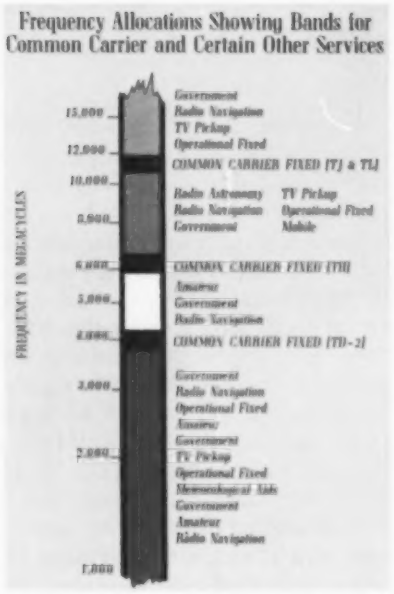
In view of these economies, and the large telephone circuit capacity of the TH channels, it is expected that the principal use of the TH system over the next several years will be to increase the message-handling capacity of existing main routes. A fully-loaded TH route will be able to handle 11,160 telephone circuits as compared to 6,000 telephone circuits on a fully-loaded TD-2 route equipped with interstitial channels.

Special Features

Among the many novel features included in the TH system, particular mention should be made of the traveling wave tube, since this is its first commercial application in the Bell System. It is used as the power amplifier in the TH transmitter, producing an output signal level of five watts. Additional traveling wave tubes are also used in the microwave carrier supply. The traveling wave tube is operated on a principle entirely different from the usual vacuum tube. In the traveling wave tube the signal passes through a spiral conductor in the presence of a strong electron stream directed along the axis of the spiral. Energy from the electron stream combines with the signal to increase its amplitude much as the wind blowing over the surface of the sea increases the size of the waves.

Another interesting feature of the TH design is the use of sliding equipment racks. These racks pull out from the bay, with the equipment in operation, much as a drawer slides out of a filing cabinet, except that the TH racks are tall and narrow as illustrated in the accompanying photograph. When pulled out, ready access to the equipment for maintenance is provided from two sides.

An all-transistor automatic protection switching system is used with TH to transfer service from a channel that has failed, or experienced a deep fade, to a protection channel. New fast-acting all electronic switches which have an operating time of only about two microseconds are used instead of the electro-mechanical relay employed in the TD-2 switching system. This



Wise decision *of FCC in setting aside frequency bands in 1944 is now paying off in terms of economical facilities.*

switch enables present types of telegraph and data signals to be transferred from a fading channel to a protection channel without losing a single pulse. Switching interruptions would be somewhat longer, however, if sudden equipment failures occurred.

Outage time on the system will be further minimized by two protection channels for systems equipped with two to six broadband working channels. Any one of the working channels that has faded or failed can gain access to either of the protection channels if they are not already in use.

Installations now under way will provide through connections via TH microwave between New York and Salt Lake City by March 1962 and across the continent to San Francisco by 1963. Furthermore, many sections of this route will be equipped with a second broadband working channel by 1962 to take care of the growing demands for long-haul service.

The long-range planning of the Bell System coupled with the wise action taken by the Federal Communications Commission in 1949 in setting aside frequency bands in the microwave range for common carrier service has been paying, and will continue for many years to pay, handsome dividends to the people of the United States. Together the Bell System and the FCC have made available ample and economical long-distance facilities —an important contribution to telephone service which is unsurpassed anywhere in the world.

Who's Who & What's What In This Issue

James M. Freeman

Edgar Peske

IN DISCUSSING Bell's Plan in Space (Page 2), James M. Freeman comes to grips with some of the most vital issues facing the Bell System today.

Attainment of a commercially operative communication satellite system is a "national objective" of the United States. As Mr. Freeman points out, the importance of gaining understanding of Bell System policies and purposes in helping meet this objective should not be underestimated.

As assistant vice president, Public Relations, Mr. Freeman has the responsibility at A. T. & T. of coordinating public relations activities connected with space. He brings to this job a background of more than 20 years of newspaper, advertising and employee information experience. After receiving a journalism degree from the University of Missouri, he spent eight years in editorial and advertising positions on Iowa, Missouri and Michigan newspapers before joining Southwestern Bell as a copywriter in 1939.

He held public relations posts of increasing responsibility in Southwestern Bell, A. T. & T. and the Michigan Bell Company before being named to his present post in 1957.

IN HIS ARTICLE, "Bell Telephone Companies and National Economic Progress," (Page 8), Edgar Peske deals forthrightly with an aspect of our business which is sometimes not fully ap-

preciated—the very significant contribution of the Bell Companies to the growth and stability of the U. S. economy. He goes on to remind us that the nation has achieved the highest economic level in the world largely through private industry in general. He stresses the fact that U. S. industry—ours included—will be the primary force in achieving the growth we need in the future, but that the government must provide favorable conditions for such growth.

Mr. Peske, A. T. & T. assistant vice president, Administration G, is well qualified to write on this timely and important System-wide—and nationwide—topic. A graduate in economics of the University of Wisconsin, he also holds a Master's degree from Northwestern University. He is a member of the Investment Analysts Society of Chicago (formerly of its Board of Governors), and belongs to the American Economic Association, American Finance Association, American Statistical Association and the American Accounting Association.

In 1930 Mr. Peske joined Illinois Bell, and served in various positions before joining A. T. & T. in 1943. Then, in 1945, he accepted the position of general rate engineer with Michigan Bell and was named general revenues engineer in 1951. Later that same year he returned to A. T. & T. In 1954 he was appointed to the position of assistant vice president of Revenue Requirements and Finance at Illinois Bell. Since May, 1960, Mr. Peske has been an assistant vice president of A. T. & T., engaged in business research problems for the Administration G Department.

FULL AND VARIED experience in the building business has enabled Howard E. Phillips, A. T. & T. building engineer, to write interestingly and authoritatively on the topic, "Better Buildings Make Better Neighbors," (Page 12).

Mr. Phillips began his career in building construction at the age of 13, as a construction material elevator operator. He also worked in various capacities in the contracting business, including superintending projects and holding managerial positions in a partnership. In 1933 he entered Armour Institute of Technology in Chicago—and then transferred to the University of Illinois, where, in 1939, he graduated with honors in Architectural Engineering. Later he obtained a second professional degree in engineering. Also in 1939 he was awarded the Alpha Rho Chi Medal for Architectural Engineers, the American Society of Civil

Howard E. Phillips

Engineers prize, the Plym Prize in Architectural Engineering and the Plym Foreign Traveling Fellowship for architectural achievement. After graduation, he worked with the U. S. Army Engineers for three years in charge of a design division, before joining a Construction Battalion (Seabees) of the U. S. Navy.

Mr. Phillips' work as an officer in the Navy during World War II kept him in construction work—he worked as liaison officer in Washington on storage buildings, air fields, hospitals, personnel quarters, etc., and, later, on planning of the Navy's permanent overseas bases.

Mr. Phillips worked as building engineer with Ohio Bell before coming to A. T. & T. in 1954. He is a member of the American Institute of Architects and the American Society of Civil Engineers; also the Gargoyle and Sigma Tau honor societies. He is vice chairman of the Programs Committee, on the Finance Committee, and Chairman of a Planning Committee of the Building Research Institute—a division of the National Academy of Sciences—National Research Council.

JACK W. BASFORD, whose article on Farm Interphone, "A New Voice For The Farm" appears on Page 32, has just returned from presenting this new service to more than 1700 telephone people all over the Bell System. As Market Department staff representative, in charge of the Farm Interphone marketing program, Mr. Basford had also the responsibility of coordinating the development of the many promotion and selling techniques associated with this new product, prior to presenting the program to the Associated Companies.

Jack W. Basford

Mr. Basford's career with the Bell System started in 1949, after his graduation from the State University of Iowa. He began his career in the Plant Department of Northwestern Bell in Iowa, and, during the next 11 years, held various positions in Northwestern Bell, including those of sales manager, commercial training supervisor, assistant commercial personnel supervisor, and district commercial manager. In the latter capacity he gathered useful information about the communications problems of farmers, since his district included a number of farms. Consequently, many of his personal experiences are reflected in the Farm Interphone marketing program.

Following his assignment as district manager, he moved to Northwestern's General Offices in Omaha, and then,

Eugene E. Mark

in June of 1960, he came to A. T. & T. to work in the New Product Marketing Group.

SECURING quality people in a quality-short employment market is a problem to many employers today. As a consequence they are turning more and more to the high schools in this competitive area of selective employment.

"The Modern Telephone Operator" by Peter B. Howell in the Autumn 1960 *Bell Telephone Magazine,* emphasized the growing need for high employment standards. To meet these standards, many telephone companies have gone to the high schools with advanced hiring and part-time student employment. A number of Associated Companies have found that a workshop program for high school guidance counselors is a very effective tool in taking advantage of this employment source.

Eugene E. Mark, general traffic personnel supervisor for the Suburban Area of the Illinois Company tells of Illinois Bell's experience with such a program in "A Workshop For High School Counselors," (Page 37). Mr. Mark started with Illinois Bell in Chicago in 1924. He has worked with telephone operators as district traffic manager in various Illinois localities, and as division traffic manager in Springfield. He became general traffic personnel supervisor in 1952. In this capacity he is concerned with management development, craft training, labor relations, force maintenance and various personnel matters.

He has been directing considerable attention to operator prestige factors and quality employment and their impact on the company image. Included in this activity was a study leading to "The Image of the Operator" and some follow-up impressions by Dr. W. M. North of Knox College.

RICHARD D. CAMPBELL has been involved in radio engineering work for many years, including work leading to the original allocation of microwave bands for common carrier services including the band in which TH operates. In his job as point-to-point radio engineer for A. T. & T., a position he has held since 1951, Mr. Campbell has had much experience with long-haul microwave, overseas, and television pick-up problems. As a result of this experience his article in this issue, "TH Opens New Vista in Microwave," (Page 44) has the authority of extensive personal knowledge of TH developments.

Radio engineering has long been one of Mr. Campbell's special interests. He studied engineering at George Washington University, and graduated in 1922 with the degree of BSEE. After his graduation in 1922, he joined the Chesapeake and Potomac Telephone Companies, and, until 1930, worked on electrical coordination matters. He joined A. T. & T. in New York in 1930. During 1943 and 1944 Mr. Campbell served as expert consultant to the Secretary of War on radio frequency problems, and in 1948 and 1949 he served as an industry advisor to the U. S. representative to the Provisional Frequency Board in Geneva.

Mr. Campbell is a Fellow of the Institute of Radio Engineers and a Senior Member of the American Institute of Electrical Engineers.

Richard D. Campbell

In The News

- *Record Sales for Western*
- *Dial TWX Trial*
- *Area Code Directory*
- *New Cable*
- *Bell-U.S.I.T.A. Agreement*
- *Zeus Program Expanded*

Western Electric's total sales in 1960 reached 2.6 billion dollars—highest figure in the company's history, and some $300,000,000 more than in 1959. Seventy per cent of this business was in sales to the Bell Telephone companies, which totaled $1,850,000,000.

Western's sales to the U.S. Government were up too, amounting to $725,000,000. Earnings averaged about 4.7 per cent of sales and totaled nearly $125,000,000.

Bell Telephone companies found the price of products manufactured by Western Electric reduced on the average of about two per cent during 1960, resulting in savings to them of about $25,000,000. On the matter of service, W.E. succeeded in getting 98 per cent of its deliveries to customers by the promised date.

Payments to suppliers and carriers made by W.E. in 1960 approximated 1¼ billion dollars—exceeding the billion dollar figure for the fifth time in the past six years. Materials and services were bought from nearly 40,000 supplying firms in the United States and abroad.

W.E.'s military and space work for the U.S. Government accounted for about 27 per cent of the year's business, as measured by sales. The value of such production and services totaled approximately $725,000,000. Well over half of this sum went to subcontractors and suppliers.

Among major projects for which W.E. provided production, engineering, and management services were the following: Project Mercury, Titan, the Tiros and Echo satellites, Nike missile systems, BMEWS, DEW-East, Blue Grass, SAGE, and various projects for the Navy, including shipboard weapons direction systems and the Missile Impact Locating System.

Looking Toward conversion of TWX service to dial operation in September 1962, a trial of placing TWX calls over the DDD network has been started using prototypes of future standard station equipment.

Fifty TWX stations are involved, using Model 28 Keyboard Send-Receive (KSR) and Model 28 Automatic Send-Receive (ASR) teletypewriters at both Telephone Company and customer locations in New York, Philadelphia and Boston. Each trial station can complete calls either over the manual TWX network or to other trial stations over the DDD network. Initial results of the trial are generally favorable, and have been forwarded to the Laboratories for use in final data set design.

The Proper Use of area codes contributes substantially to faster and more pleasing long-distance service to our customers. All customers—both those with DDD and those who place long-distance calls with an operator—need to know more about area codes and how to use them.

A new publication, "Area Code Directory," which was recently transmitted to the Companies, can make a real contribution in bringing this about. In addition to improved service, an appreciable saving can be made in operating expense.

The directory contains the complete list of cities, towns and localities (about 30,000) which can be reached by dialing or

calling the respective area code and telephone number. It is intended for distribution to publishers of national or regional trade directories and membership lists, large toll users, and other customers who may have use for a complete list of places with which area codes should be used. It also will be helpful at rate and route desks, information offices, revenue accounting centers, business offices and other Company locations.

A Recently Developed self-supporting taped-sheath PIC cable has a built-in supporting wire which eliminates the need for separate supporting strand. It is expected to produce savings in both material and installation costs.

The new cable has been named "HELIPIC." Extensive field trials are being started to test it throughout the System. "HELIPIC" will also be examined for possible use in lieu of rural and urban distribution wires.

A New Series of fire resistant plastic insulated conductor cables is now being manufactured. It is suitable for connecting outdoor cables to central offices, CDO's and large PBX's, and for use in open riser shafts in buildings.

Electrical characteristics are expected to be equivalent to those of PIC cable and distinctly superior to existing types of terminating cables.

Cost savings are anticipated due to lower cost of material and elimination of testing permitted by the fully color coded insulation. It is expected that these cables will supersede various textile insulated lead sheath cables and lead sheathed PIC cables.

Agreement has been reached between representatives of the Bell System and the U. S. Independent Telephone Association for making new studies of Independent Company costs of handling interchanged toll business. Pending completion of the basic studies and the development of new schedules, an interim adjustment in settlements will be made for a period of one year amounting to around $10 million, assuming all Independent Companies were utilizing average schedules. This increase reflects possible changes in calling patterns due to WATS, and other factors in handling long-distance business between Bell and Independent Companies.

The last study of Independent costs of handling Bell-Independent long-distance messages was made in 1955 following which new settlement schedules were introduced. These schedules were adjusted in October 1959 to reflect estimated changes in costs of Independent Company operations subsequent to the 1955 study.

The Army has expanded its testing program for the Nike Zeus anti-missile missile system. In addition to missile firing tests, which have been conducted at White Sands Missile Range, New Mexico, since August 1959, other phases of the Zeus testing program will be carried out at four major sites: White Sands; Point Mugu, California; Kwajalein Island in the Pacific; and Ascension Island in the Atlantic.

Western Electric, as prime contractor, heads up the industrial side of the Army-industry team working on Nike Zeus. Bell Laboratories has the responsibility for over-all system design and development.

Nike Zeus on launcher.

Scientists at Bell Laboratories have demonstrated the feasibility of producing extremely high magnetic fields with superconducting solenoid magnets. They used a new superconducting compound prepared from the metals niobium and tin in their experiments.

The new material development will have important applications wherever large volumes of high magnetic fields are required, including many in communications. For instance, traveling wave tubes and masers require magnetic fields for their operation. The ready availability of large magnetic fields can extend the operation of these devices to higher frequencies, providing the possibility of broadband communication systems for use in earth-based radio-relay systems and active satellite repeaters for space communications.

Another big step has been taken toward improving our "readiness to provide business service." The Western Electric Company factory delivery interval for "computer-engineered" 740E PBX systems (40, 60 or 80 line capacity) has been reduced from four weeks to one week. This advance follows an earlier one, made about a year ago, when the "computer-engineered" plan was inaugurated. It reduced Telephone Company engineering effort to a few hours spent on filling in a "short order" form, which provides information for a computer that does the detailed engineering in a few minutes.

Installations of buried distributing plant in urban areas have almost doubled each year since 1955. Installations during 1960, upon completion of houses on all lots, will provide for underground service to about 100,000 urban and rural families.

Companies that have been in the forefront in this field are realizing substantial savings in plant investment and anticipate even greater savings as techniques improve and closer coordination with other utilities is realized.

Part of the vast Project Mercury tracking and communications network, installed by a Western Electric-led team, had an opportunity to try its equipment with the space flight of Ham, the chimpanzee, down the Atlantic Range. Stations at Cape Canaveral, Bermuda, Grand Turk Island, and Grand Bahama Island, as well as one of the ships in the Mercury program, exercized their communications equipment in the successful flight.

Bell Labs scientists test superconductive compound.

NEW BUILDINGS are just one part of the Bell System's 1961 construction program. There are hundreds of other projects, of many kinds, and in many places throughout the country.

Bell System's 2½ Billion Dollar Construction Program Provides Work and Wages in Many Lines

This big Bell System construction program for 1961 is more than better telephone service.

It is more than additional tax money for cities, states and the government.

It is work and wages for people. Thousands upon thousands of people. Both inside and outside the Bell System.

Each week it puts more millions of dollars into pocketbooks and cash registers throughout the country.

It's a big effort and shows the vital part of the Bell System in the nation's economic life and growth.

There is much more to be done . . . and with earnings adequate to support the job, we'll keep moving right ahead, improving telephone service and helping America grow.

BELL TELEPHONE SYSTEM

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